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NOVEMBER 6, 1942

FEDERAL STANDARD STOCK CATALOG

Section IV

(Part 5)

FEDERAL SPECIFICATION

FOR

COMPOUND; GREASE-CLEANING, SOLVENT-EMULSION-TYPE

This specification was approved on the above date by the Director of Procurement, for the use of all departments and establishments of the Government, and shall become effective not later than February 1, 1943. It may be put into effect, however, at any earlier date after promulgation.

A. APPLICABLE SPECIFICATIONS.

A-1. The following Federal Specifications, of the issue in effect on date of invitation for bids, shall form a part of this specification:

P-S-536. Soap and Soap Products. General Specifications (Methods for Sampling and Testing).

VV-K-211. Kerosene.

VV-L-791. Lubricants and Liquid Fuels; General Specifications (Methods for Sampling and Testing).

B. TYPES AND GRADE.

B-1. Grease-cleaning compound of the solvent-emulsion-type, as specified herein, shall be furnished in one grade and in the following types (see notes I-2 and I-3).

Type I. Nonphenolic.

Type II. Phenolic.

C. MATERIAL.

C-1. The material shall be suitable for the purpose intended and as specified hereinafter.

D. GENERAL REQUIREMENTS.

D-1. The manufacturer shall prominently place upon each container application directions.

E. DETAIL REQUIREMENTS.

E-1. The grease cleaning compound shall be a uniform liquid.

E-1a. Type I.—Nonphenolic.

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**E-1a (1). Flash point.**—The flash point shall be not less than 200° F. (open cup).

**E-1a (2). Neutralization number (acid value).**—The compound shall have a neutralization number of not more than 8 (mg. of KOH to neutralize 1 gm. of compound).

**E-1a (3). Free alkali.**—The compound shall have no free alkali.

**E-1a (4). Pour point.**—The pour point shall be not more than 35° F.

**E-1a (5). Volatile matter.**—The loss in weight shall be not more than 10 percent after a 24-hour period (see par. F-6).

**E-1a (6). Phenols.**—Shall be free from phenols (see par. F-7a).

**E-1a (7). Physical and performance tests.**—

**E-1a (7) a. Stability of emulsion.**—Shall meet test specified in paragraph F-8a.

**E-1a (7) b. Solubility in kerosene and in water.**—Shall meet test specified in paragraph F-8b.

**E-1a (7) c. Performance.**—Shall meet test specified in paragraph F-8c.

**E-1b. Type II.**—Phenolic.

**E-1b (1). Flash point.**—The flash point shall be not less than 200° F. (open cup).

**E-1b (2). Neutralization number (acid value).**—The compound shall have a neutralization number of not more than 8 (mg. of KOH to neutralize 1 gm. of compound).

**E-1b (3). Free alkali.**—The compound shall have no free alkali.

**E-1b (4). Pour point.**—The pour point shall be not more than 35° F.

**E-1b (5). Volatile matter.**—The loss in weight shall be not more than 10 percent after a 24-hour period (see par. F-6).

**E-1b (6). Phenols.**—The material shall contain not less than 15 percent nor more than 25 percent phenols, by volume (see par. F-7b); and shall pass the phenol ( $C_6H_5OH$ ) limitation test (see par. F-7c).

**E-1b (7). Physical and performance tests.**—

**E-1b (7) a. Stability of emulsion.**—Shall meet test specified in paragraph F-8a.

**E-1b (7) b. Solubility in kerosene and in water.**—Shall meet test specified in paragraph F-8b.

**E-1b (7) c. Performance.**—Shall meet test specified in paragraph F-8c.

#### F. METHODS OF SAMPLING, INSPECTION, AND TESTS.

**F-1.** A representative sample of the material shall be taken from each delivery and sent to the laboratory for test. The sample shall be not less than 1 quart nor more than 1 gallon.

**F-2. Flash point.**—The flash point of the material shall be determined in accordance with Method 110.33 (flash and fire point by means of open cup) of Federal Specification VV-L-791.

**F-3. Neutralization number.**—The neutralization number shall be determined by Method 510.31 (Method B) of Federal Specification VV-L-791, except that 200 ml. of alcohol shall be used.

**F-4. Free alkali.**—The free alkali shall be determined in accordance with Method No. 30.2 (Free alkali or free acid) of Federal Specification P-S-536.

**F-5. Pour point.**—The pour point of the material shall be determined in accordance with Method 20.16 (cloud and pour points) of Federal Specification VV-L-791.

**F-6. Volatile matter.**—Place about 10 grams of the material, accurately weighed, upon a tared 4-inch watch glass. Allow to stand in a well-ventilated room 24 hours at a temperature of  $77^\circ \pm 4^\circ$  F. and a relative humidity of  $50 \pm 4$  percent. Determine the loss in weight of the sample.

**F-7. Phenols.**—

**F-7a. Qualitative determination.**—To a 150-ml. Erlenmeyer flask add 5 ml. of the sample, 95 ml. of distilled water, and 3 grams of fuller's earth. Mix thoroughly and filter. Discard first 25 ml. To a 5 ml. portion of the filtrate in a large test tube add 2.5 ml. Folin's reagent (see par. F-7a (1)), 40 ml. distilled water, and 5 ml. sodium carbonate solution (sp. gr. 1.15). Prepare a standard comparison solution by treating 5 ml. of a freshly made phenol solution (0.005 percent phenol ( $C_6H_5OH$ ) by weight) in the same manner as for the sample. Place all of the tubes in a large beaker filled with water at a temperature of approximately 140° F. and let stand on a steam bath for about 1 hour. Compare the sample and the comparison standard for color. If the color of the sample is lighter than that of the standard, the sample shall be considered free from phenols.

**F-7a (1). Folin's reagent.**—Boil together for 2 hours 100 grams reagent quality sodium tungstate, 19 grams reagent quality molybdic acid, 50 ml. of syrupy phosphoric acid (85 percent), and 75 ml. distilled water. Cool. Make up to a volume of 1 liter with water, and filter.

**F-7b. Quantitative determination.**—Fill a 25 ml. graduated cylinder to the mark with the well-mixed sample maintained at a temperature of  $77^\circ$  F. plus or minus  $1^\circ$  F. Transfer the contents of the cylinder to a 200 ml. distilling flask by rinsing with a total of 75 ml. of freshly washed kerosene (the kerosene shall be in accordance with Federal Specification VV-K-211 and shall be washed twice with N/10 aqueous sodium hydroxide solution, then with distilled water until neutral, and freed from water by settling and pouring through an absorbent filter paper) in successive portions. Add 2.5 grams of powdered sodium bicarbonate. Thoroughly mix the contents of the flask by swirling. Distill the contents of the flask at a rate of not more than 2 drops per second until the distillate comes over strongly yellow, collecting the distillate in a 100 ml. tar-acid separatory funnel. Run off any aqueous layer, shake the kerosene layer with 10 ml. of sulfuric acid (49 to 51 percent, by weight), and allow to stand for 1 hour. Draw off the acid layer completely and discard it. Repeat with another 10 ml. portion of sulfuric acid. Measure the kerosene layer at  $25^\circ$  C. add to the kerosene layer 80 ml. of aqueous sodium hydroxide solution (15 percent, by weight), shake, and allow to stand for 2 hours. Draw off the lower layer and discard it. Repeat with 60 ml. of sodium hydroxide solution and allow to stand for 1 hour. Measure the kerosene layer at  $77^\circ$  F. plus or minus  $1^\circ$  F. The difference between the two measurements multiplied by 4 shall be considered the volume percentage of total phenols in the sample.

**F-7c. Phenol ( $C_6H_5OH$ ) limitation test.**—Weigh 5 grams  $\pm 0.1$  mg. into a 250 ml. volumetric flask containing 10 ml. of sodium hydroxide

solution (10 percent) and add distilled water to the mark. Shortly before the determination, place 5 ml. of the above solution in a 200 ml. volumetric flask and after dilution to about 50 ml. with distilled water, add 1 drop of methyl orange indicator. Add dilute nitric acid (see par. F-7c (1) b) until practical neutrality is reached. Bring the solution to the mark with distilled water and mix. Place 5 ml. of this solution into each of 2 graduated test tubes (graduated at 25 ml.), provided with rubber stoppers. Into each of 2 other test tubes place 5 ml. of a freshly made standard phenol solution (0.025 percent phenol ( $C_6H_5OH$ ) by weight). Add to each of the 4 test tubes 5 ml. of the Millon reagent (see par. F-7c (1) a) by flowing down the sides of each tube, mix. Place the tubes in a water bath, already boiling, and maintain at boiling for 30 minutes. Immediately cool tubes by immersing them in cold water for at least 10 minutes. When cool, add to each tube 5 ml. of dilute nitric acid (see par. F-7c (1) b) and mix. To one of each pair of tubes add 3 ml. of dilute formaldehyde solution (see par. F-7c (1) c). Bring the volume of each tube to the 25-ml. graduation with distilled water. Stopper, shake well, and set aside for 18 hours. Mark the tubes as follows: Sample plus formaldehyde marked "sample blank"; sample alone marked "unknown"; phenol standard plus formaldehyde marked "phenol blank"; phenol standard alone marked "phenol standard". (Note: Tubes containing formaldehyde will have faded to yellow on standing; tubes without the formaldehyde will possess an orange or red tint on standing). From each of the 2 phenol tubes pipette 20 ml. into 100 ml. volumetric flasks, add 5 ml. of the dilute nitric acid to each flask, and make up to the mark and mix well. The red flask contains the "phenol standard," the yellow the "phenol blank." Transfer these phenol solutions to burettes. Pipette 10 ml. of the "sample blank" solution and the "unknown" solution into Nessler tubes (50 ml., tall form). The Nessler tubes and burettes should be properly marked to avoid confusion. Run into the "sample blank" a measured amount of the "phenol standard"; and the same volume of "phenol blank" shall be run into the "unknown." Agitate the contents of both Nessler tubes and compare colors. Not more than 3 ml. of the "phenol standard" solution shall be required to effect a match of color with "sample blank" tube. (Note: Each 1 ml. of "phenol standard" used is equivalent to 1 percent phenol, by weight, in the sample.)

**F-7c (1). Reagents.—**

**F-7c (1) a. Millon reagent.**—Prepare by placing 2 ml. of mercury and 20 ml. of concentrated reagent quality nitric acid into a 100 ml. Erlenmeyer flask. Place flask under a hood and shake as much as need be after the first violent reaction to effect subdivision of the mercury and maintain action. After about 10 minutes, when action has practically ceased, even in the presence of mercury, add 35 ml. of distilled water. If basic salt separates, add dilute nitric acid to dissolve it. Add sodium hydroxide solution (10 percent) by drops until the curdy precipitate following a single drop no longer redissolves but disperses to an apparent permanent turbidity. Add 5 ml. of dilute nitric acid, mixing well. This solution is suitable for use for about 24 hours, but deteriorates after that time.

**F-7c (1) b. Dilute nitric acid.**—Prepare by blowing air through concentrated nitric acid until colorless, then diluting 1 volume with 5 volumes of distilled water.

**F-7c (1) c. Dilute formaldehyde solution.**—Prepare by diluting 2 ml. of commercial 37 percent solution to 100 ml. with distilled water.

**F-8. Physical and performance tests.**—The following tests shall be carried out on both the original compound and on the compound treated as follows: Place one-half pint of the compound in a clean metal container having a cross-sectional area of 25 to 28 square inches (surface exposure). The exposed surface of the compound shall be less than 1 inch from the top of the container. Allow the open container to stand for 48 hours at a temperature of 70° to 80° F. The material so treated shall be used.

**F-8a. Stability of emulsion.**—Place 5 ml. of the material into a 50 ml. graduated cylinder having a ground glass stopper. Add 45 ml. of kerosene (kerosene shall be in accordance with Federal Specification VV-K-211). Stopper cylinder and shake thoroughly. Maintain temperature conditions at 70° to 90° F. The material shall readily disperse or dissolve in the kerosene to give a clear liquid without the presence of undissolved matter (see par. F-8b (1)). Pour 5 ml. of the thinned material into another similar graduated cylinder and add 45 ml. of distilled water. Stopper and shake thoroughly. A creamy emulsion shall result. Allow to stand undisturbed for 24 hours at temperature conditions of 70° to 90° F. Examine the cylinder after this period. There shall be not more than 10 percent "creaming" (floating or settling out of a layer of emulsion) with no breakdown of the emulsion.

**F-8b. Solubility in kerosene and in water.—**

**F-8b (1). In kerosene.**—Shall readily disperse or dissolve in kerosene as indicated in paragraph F-8a.

**F-8b (2). In water.**—Place 2.5 ml. of the material into a 50 ml. graduated cylinder having a ground glass stopper. Add 45 ml. of distilled water. Stopper cylinder and shake thoroughly. Maintain temperature conditions at 70° to 90° F. The material shall readily disperse or dissolve in water to form a clear liquid or a liquid with no more than a slight cloudiness. Allow to stand undisturbed for 48 hours. Examine the cylinder after this period. No material shall have separated out at the bottom or top of the liquid and the liquid shall be uniform with no more than original cloudiness.

**F-8c. Performance.—**

**F-8c (1). Preparation of solution.**—Take 25 ml. of the grease-cleaning compound and dissolve in 225 ml. of kerosene (kerosene shall be in accordance with Federal Specification VV-K-211).

**F-8c (2). Preparation of panels.**—Take aluminum panels cut from corrugated aluminum. (The corrugations shall be hollows with about 8 hollows to the inch and the depth of the hollows shall be about  $\frac{1}{16}$  inch, the size of the panels shall be 3 by 6 inches). Clean each panel with a suitable solvent. Take a lubricating oil of SAE 70 viscosity and add sufficient talcum powder to the oil to form a paste. Spread this paste, starting at a distance of 2 inches down from a 3-inch edge over the hollowed side of each panel, until level. Each panel shall be baked in an air oven maintained at a temperature of

290° to 300° F. for 3 hours. Remove. Allow to cool to room temperature.

**F-8c (3). Cleaning test.**—Suspend each panel, with the 6-inch edge in the vertical position, in the prepared liquid (par. F-8c (1)), so that only the treated section of panel is immersed. Allow to stand for 10 minutes. Temperature conditions shall be maintained at 70° to 90° F. Remove panels. Flush each panel with a stream of water (water pressure shall be between 30 and 40 pounds per square inch gage pressure; nozzle of hose shall be a glass tube 1/4 inch inside diameter and 3 inches long). The end of nozzle shall be held 3 inches from the panel. The stream of water shall be applied in a horizontal position at right angles to the surface of the panel. The panel shall be readily cleaned by the water flush. Flush the panel thoroughly. Examine the flushed panel. The paste shall have been completely (oil stains in a few of the hollows shall be disregarded) washed off the panel. Compare the cleaned section with the untreated section. The cleaned section shall show no more than extremely slight discolorations and shall show no other detrimental action.

**G. PACKAGING, PACKING, AND MARKING FOR SHIPMENT.**

**G-1. Packaging.**—Unless otherwise specified, commercial packages are acceptable under this specification.

**G-2. Packing.**—Unless otherwise specified, the subject commodity shall be delivered in standard commercial containers, so constructed as to insure acceptance by common or other carriers, for safe transportation, at the lowest rate, to the point of delivery.

**G-3. Marking.**

**G-3a. Issue packages.**—Unless otherwise specified, each package shall be marked with the name of the material, the type and the quantity contained therein.

**G-3b. Shipping containers.**—Unless otherwise specified, shipping containers shall be marked with the name of the material, the type, the quantity contained therein, as defined by the contract or order under which shipment is made, the name of the contractor, and the number of the contract or order.

**H. REQUIREMENTS APPLICABLE TO INDIVIDUAL DEPARTMENTS.**

**H-1.** The following departmental specifications of the issue in effect on date of invitation for bids, and special requirements, shall form a part of this specification, and shall be applicable to purchases made under this specification by the respective departments.

**H-2. Army.**—U. S. Army Specification No. 100-2, Standard Specification for Marking Shipments. (Copies of such publication may be obtained by prospective bidders, without cost, upon application to the distributing agency indicated in the invitation for bids.)

**H-3. Navy.**—Navy Department General Specification for Inspection of Material, copies of which may be obtained without cost upon application to the Bureau of Supplies and Accounts, Navy Department, Washington, D. C.

**H-3a. Packing.**—Unless otherwise specified, the subject commodity shall be delivered in substantial standard commercial containers, so constructed as to insure safe delivery by common or other carrier to

the point of delivery at the lowest rate and to withstand storage, re-handling, and reshipment without the necessity for further packing. Not more than one type shall be packed in a single container.

**I. NOTES.**

**I-1.** Purchasers should exercise any desired options offered herein and specify the type required (see par. B-1).

**I-2.** The grease-cleaning compound, as covered by this specification, is intended for use in the cleaning of automobile engine blocks, either by spraying or immersion, and for general cleaning of oily surfaces.

**I-3.** The phenolic (type II) grease-cleaning compound is generally considered to be more effective than the nonphenolic (type I); however, the phenolic compound leaves a strong residual odor characteristic of phenols and has possible greater irritating action when in contact with the skin than the nonphenolic type.

**I-4.** It is believed that this specification adequately describes the characteristics necessary to secure the desired material, and that normally no samples will be necessary prior to award to determine compliance with this specification. If, for any particular purpose, samples with bids are necessary, they should be specifically asked for in the invitation for bids, and the particular purpose to be served by the bid sample should be definitely stated, the specification to apply in all other respects.

**I-5.** Federal Specifications do not include all types, classes, grades, sizes, etc., of the commodities indicated by the titles of the specifications, or which are commercially available, but are intended to cover the types, etc., which are suitable for Federal Government requirements.

**I-6.** An Index of Federal specifications may be purchased as noted in the paragraph below, price to be obtained from the Superintendent of Documents.

**I-7.** Copies of this specification, and of P-S-536, VV-K-211, and VV-L-791, may be obtained upon application accompanied by money order, coupon, or cash, to the Superintendent of Documents, Government Printing Office, Washington, D. C., price 5 cents each, except P-S-536a, 10 cents; VV-L-791b, 25 cents.

**Notice.**—When Government drawings, specifications, or other data, are used for any purpose other than in connection with a definitely related Government procurement operation the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data, is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

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**AMENDMENT-1**  
**JUNE 2, 1943**

**FEDERAL STANDARD STOCK CATALOG**

**Section IV**

**(Part 5)**

**FEDERAL SPECIFICATION**

**FOR**

**COMPOUND; GREASE-CLEANING, SOLVENT-  
EMULSION-TYPE\***

This amendment was approved on the above date by the Director of Procurement, for the use of all departments and establishments of the Government, and shall become effective not later than August 15, 1943. It may be put into effect, however, at any earlier date after promulgation.

The following changes shall be made in Federal Specification P-C-576, dated November 6, 1942:

Page P-C-576-1:

Paragraph B-1:

Type II, Phenolic, insert "To be used for military purposes only."

Page P-C-576-7:

Paragraph I-3. Insert subparagraph I-3a as follows:

I-3a. The War Production Board allocates raw materials for manufacturing Type II only when the product is used for military purposes.

\*Certain provisions of this amendment are intended to conserve critical or strategic materials. When the present emergency is over, this amendment will be considered for revision.